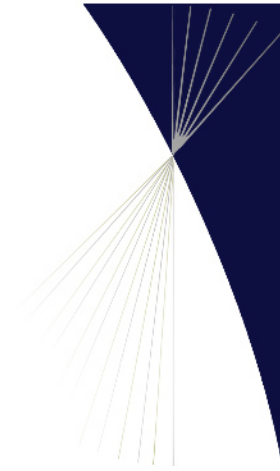


Cooperated with

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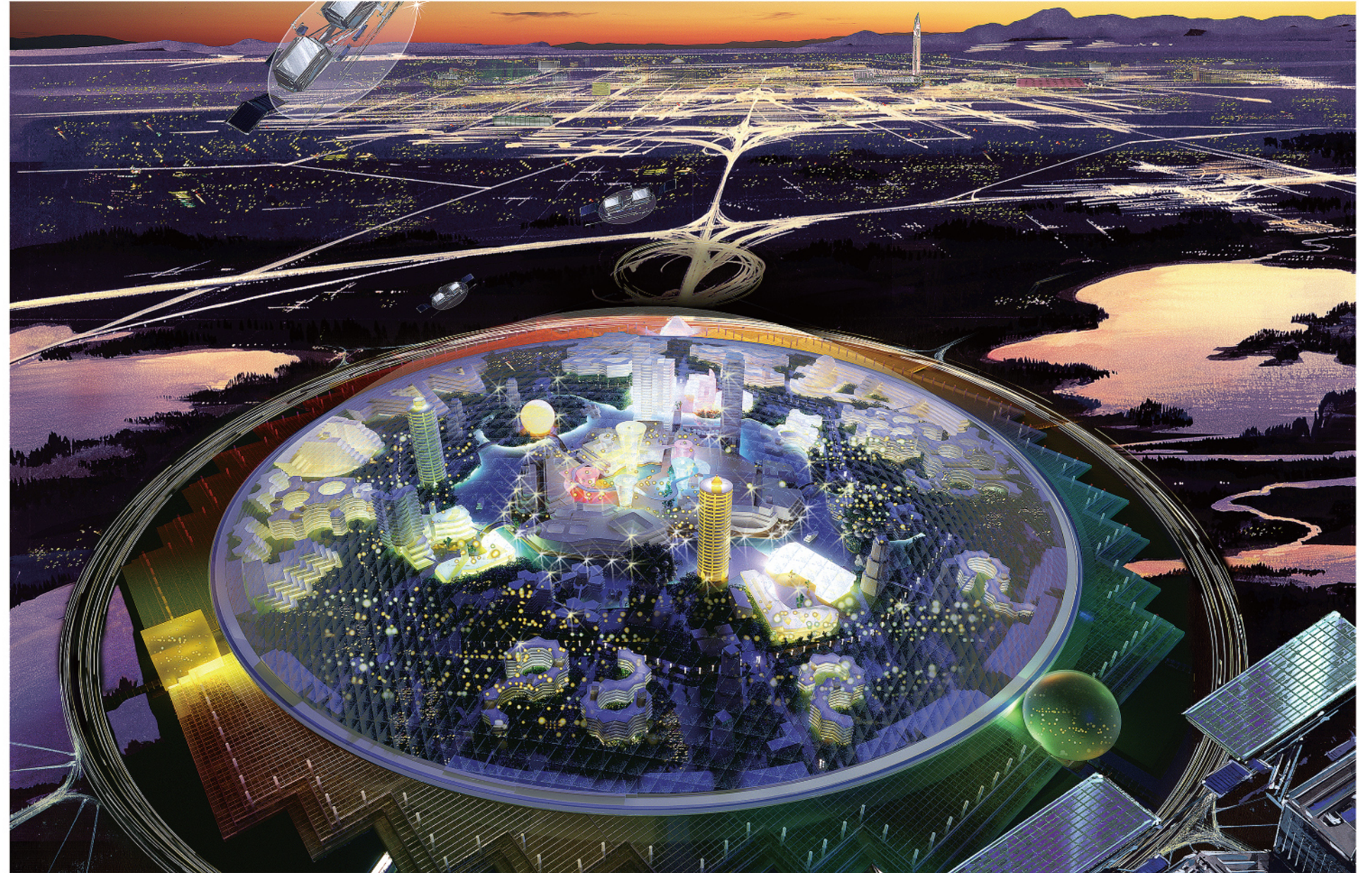
S P A C E C I T Y

The City of Change

We Make it Best

SPACE CITY
The City of Change

Bird's eye view / PJ code LN-001



Introduction

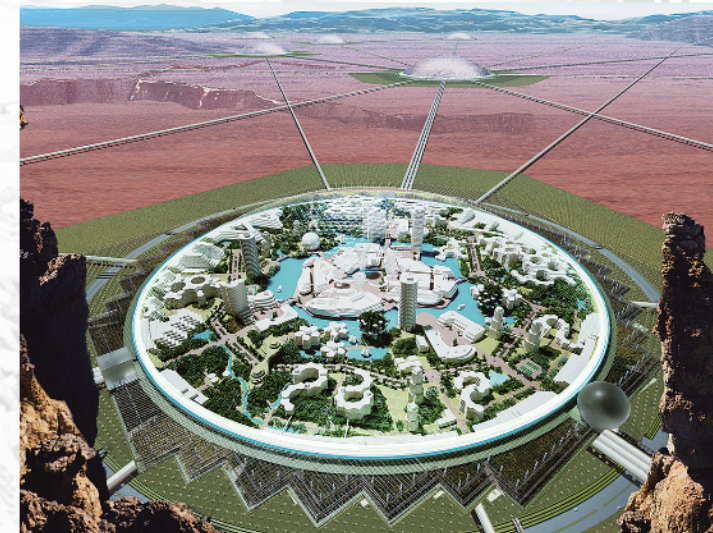
At the start of a new millennium

In this era, the “century of the environment,” our cities play a central role. In the world of tomorrow, our cities will likely have many times more people than they have today, contributing to the rapid urbanization of the living environment. The impact our cities will have on the planet Earth is tremendous. Above all, the Earth's natural environment and the ways of our energy use are issues that the world must urgently address. As we head toward these major shifts, we begin to seek a new dimension for urban development.

1997: To bring about the intrinsic appeal of city life within this new relationship with the environment, we devised a method of development called Space City. The chief undertaking of this method is to achieve a living environment on a grand urban scale in which people can interact closely with nature in a gentle climate. Even in regions with harsh climates, or in other urban areas, people could live comfortably year-round. 2010: The prospect for further improving technologies in areas such as environment and architecture have enhanced the feasibility of our study. We believe that the study will pave the way for a new stage in urban living environments. And we expect that Space City, the city with the new value of the microclimate, will become familiar to people as a new style of living environment, and will become a cornerstone of the future.

Milestones in World Cities

1873 Central park - New York,
1889 Eiffel tower - Paris,
1955 Disneyland - Anaheim,
1973 Opera house - Sydney,
2010 Burj khalifa - Dubai,
and others



Located in deserts



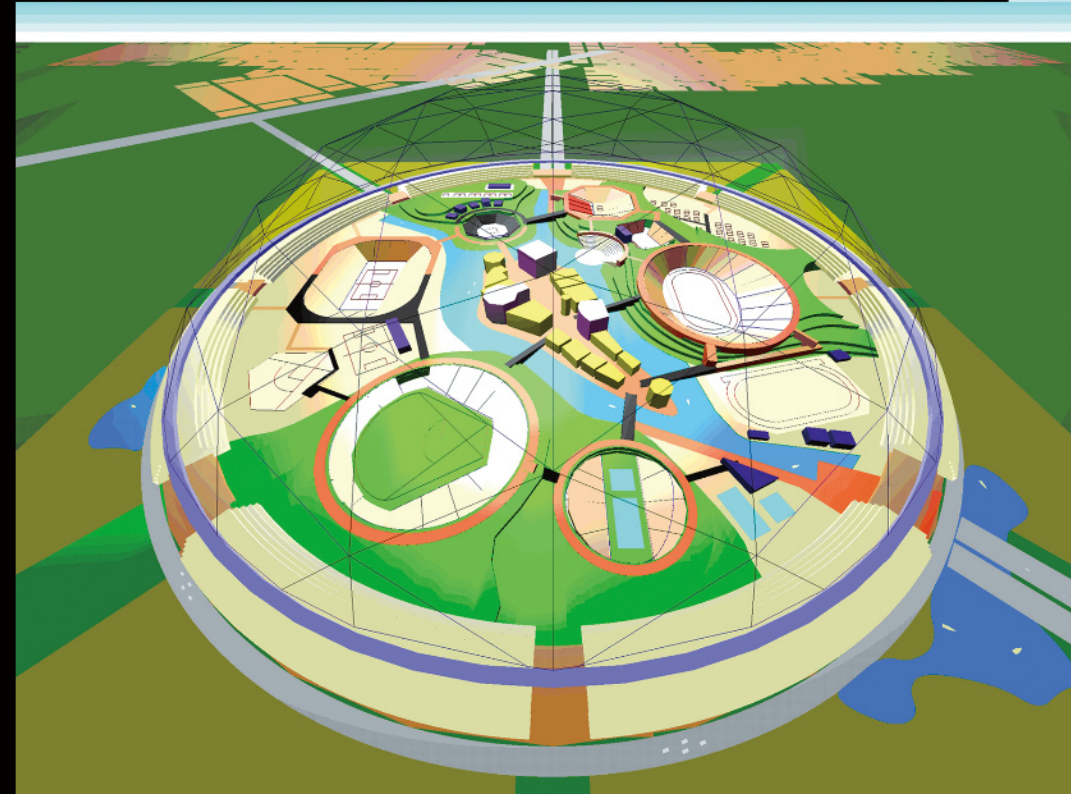
Located in the city

A Vision to Cover the City

Space City's environmental technology that covers the city (City Roof) and its design technology that effectively keeps the city concentrated (Compact City) create an urban environment with abundant green and with a comfortable climate all year round.

As development models that utilize these advantages, the following possibilities have been studied:

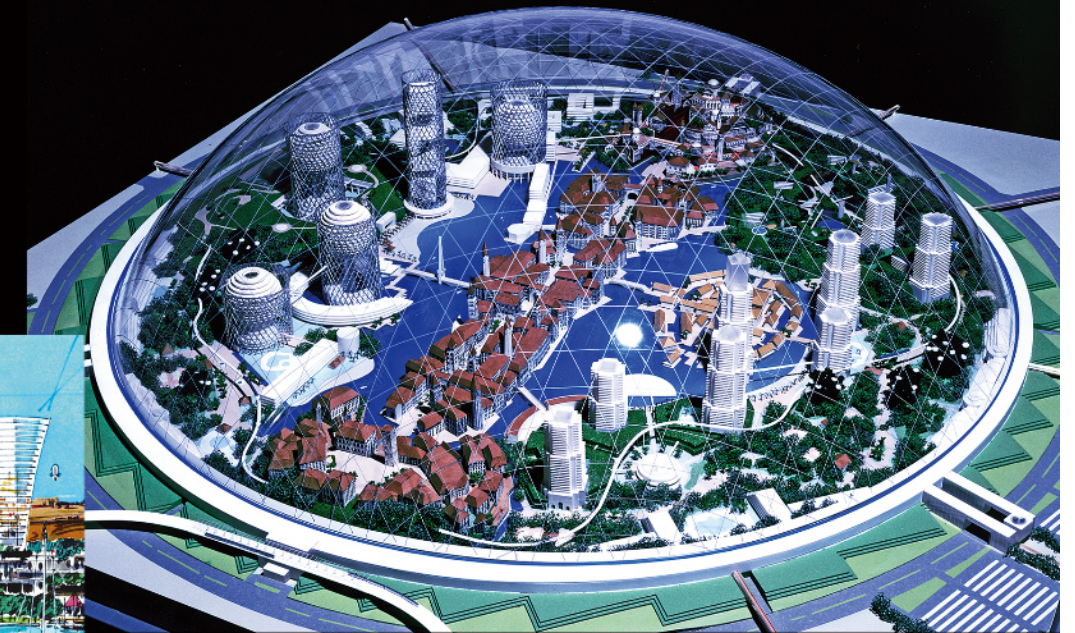
- Sports resort
- Marine resort
- Theme town resort
- Science and technology park
- Museum park
- Central business city
- Entertainment city
- Convention city



PJ code LN-004



PJ code LN-003

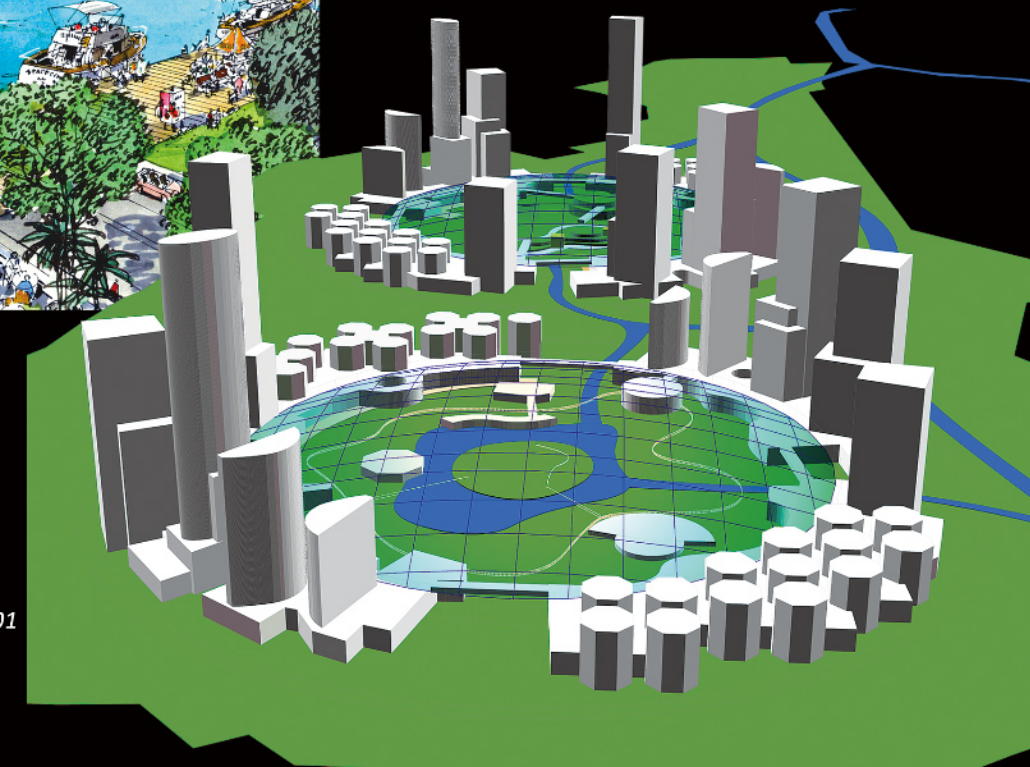


PJ code LN-002

Throughout the Year ...Activities in Space City



PJ code LN-001



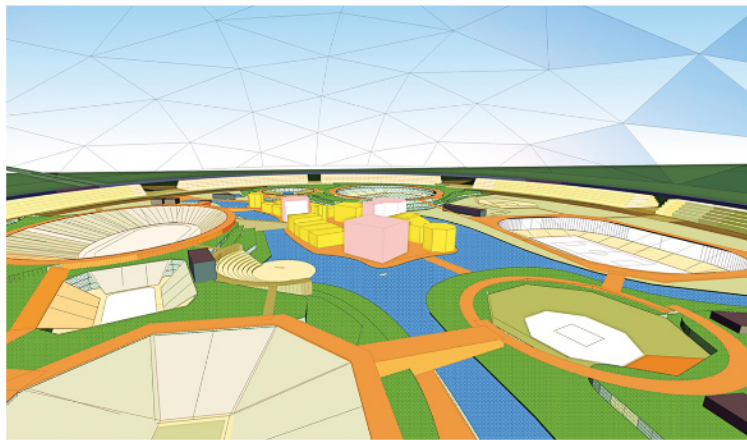
PJ code LI-001



Sports resort

PJ code LN-004

This development model is a vision of a Space City resort with a sports theme. The plan was developed so that not only athletes but also spectators, supporters, and many others can fully enjoy the sports world. Featuring an island-shaped village surrounded by relaxing, spacious hills for use in sporting events, we hope to fill the entire resort (which holds more than 200,000 spectators) with the excitement of live sports matches.



Program

- Site area: 130ha
- Dome: 1000m in diameter : 200m in height
- Total floor area: 1,400,000m²
 - Sports facilities: 18%
 - Commercial facilities and hotels: 8%
 - Education and research facilities: 19%
 - Offices and convention facilities: 9%
 - Public utilities: 46%



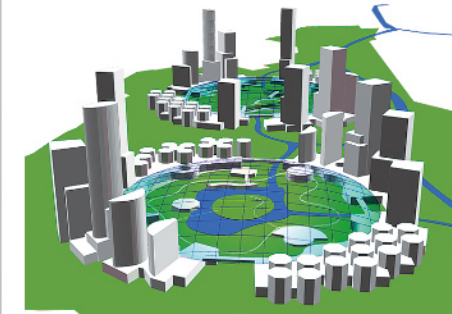
Marine resort

PJ code LN-003

Unique local landscapes and climate can be considered as some of the main resources of resorts. This plan for a seaside resort offering opportunities for longer-term stay places particular focus on location development. Water resorts that feature beaches, piers and canals, and snow resorts that allow skiing even in the summer—these are two climates that will make the overall landscape of this location truly attractive.

Program

- Site area: 60ha
- Dome: 800m in diameter, 200m in height
- Total floor area: 900,000m²
 - Commercial and cultural facilities: 9%
 - Convention facilities: 17%
 - Hotels and housing: 56%
 - Public utilities: 18%

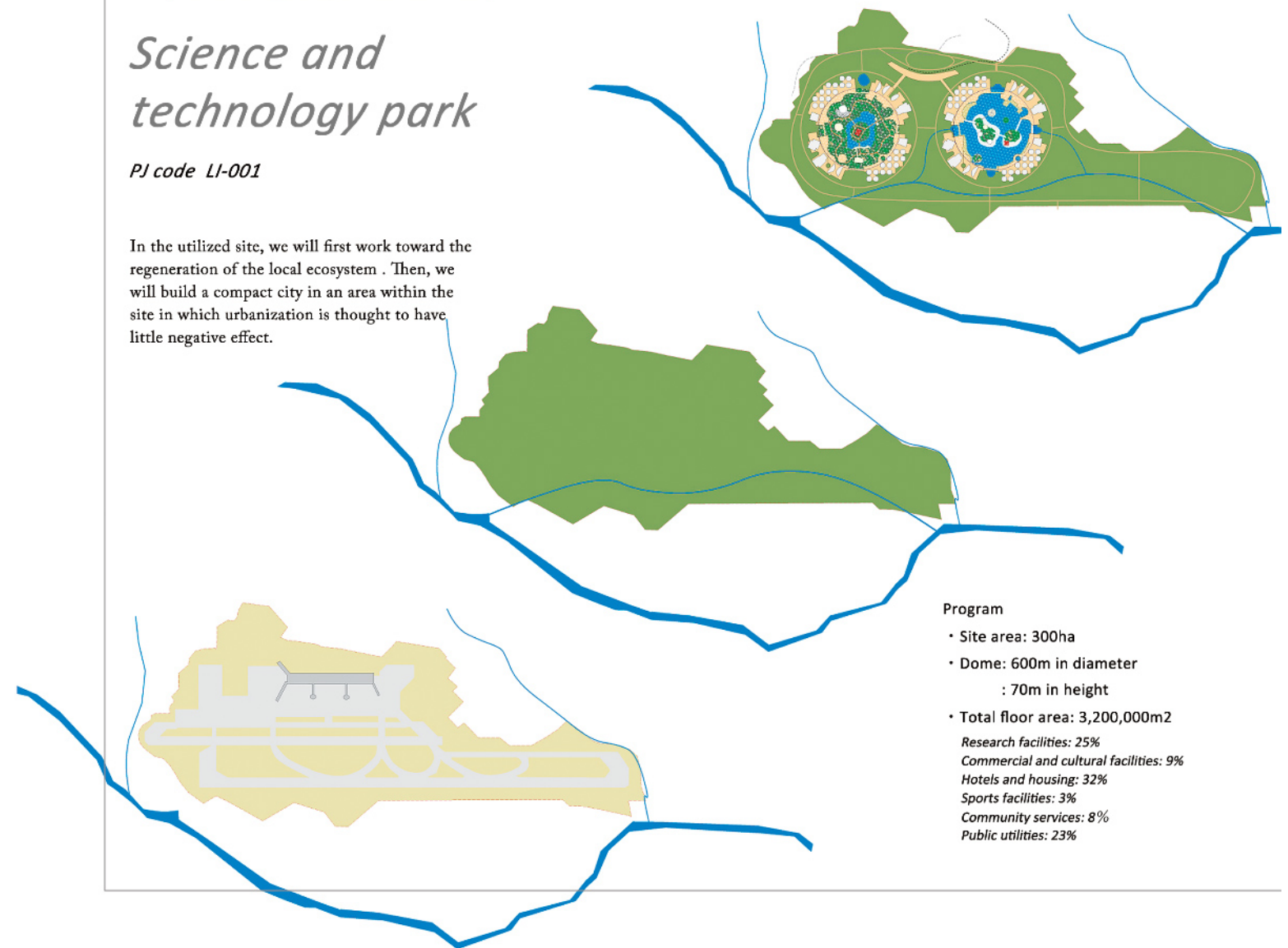


For urban reorganization, an advanced experimental city (with projected populations of 30,000-40,000) that encapsulates the wisdom of science has been conceptualized. With the intention of creating a borderless area that crosses conventional disciplines, the overall plan is mapped out in a manner that unites different elements of the city into a single, large campus. Plus, the experimental use of the large climate space of Space City for science and technology gives this plan distinctive advantages without parallel in the world.

Science and technology park

PJ code LI-001

In the utilized site, we will first work toward the regeneration of the local ecosystem. Then, we will build a compact city in an area within the site in which urbanization is thought to have little negative effect.

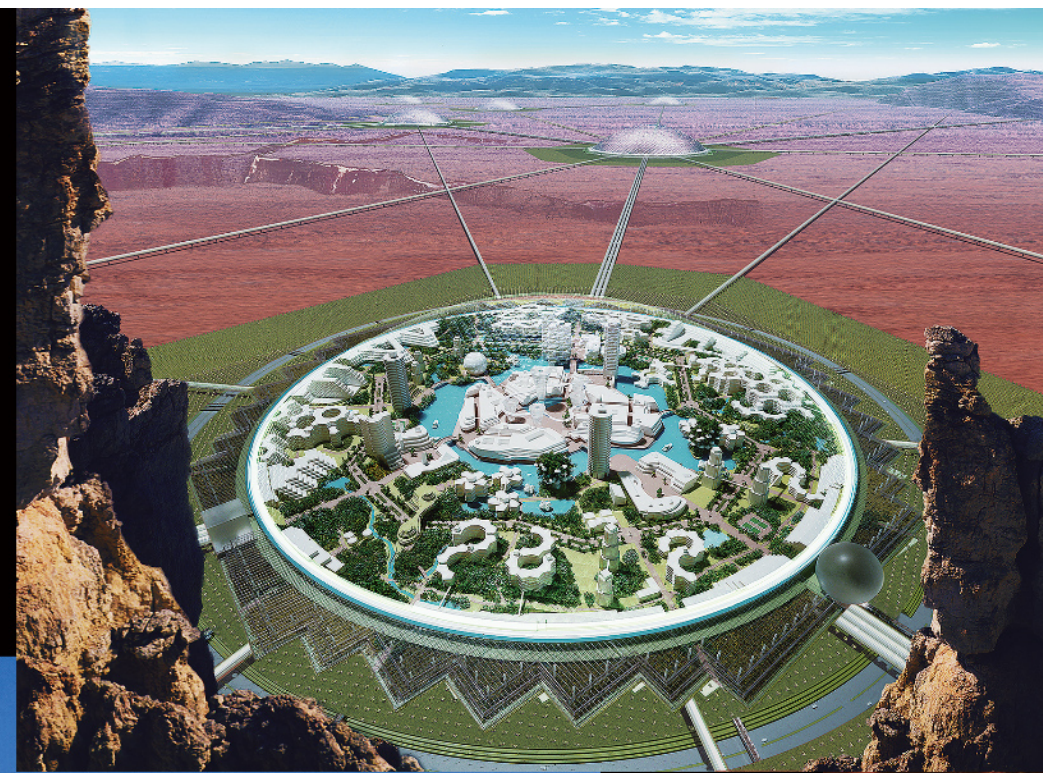


Program

- Site area: 300ha
- Dome: 600m in diameter : 70m in height
- Total floor area: 3,200,000m²
 - Research facilities: 25%
 - Commercial and cultural facilities: 9%
 - Hotels and housing: 32%
 - Sports facilities: 3%
 - Community services: 8%
 - Public utilities: 23%

Design of the Micro-climate

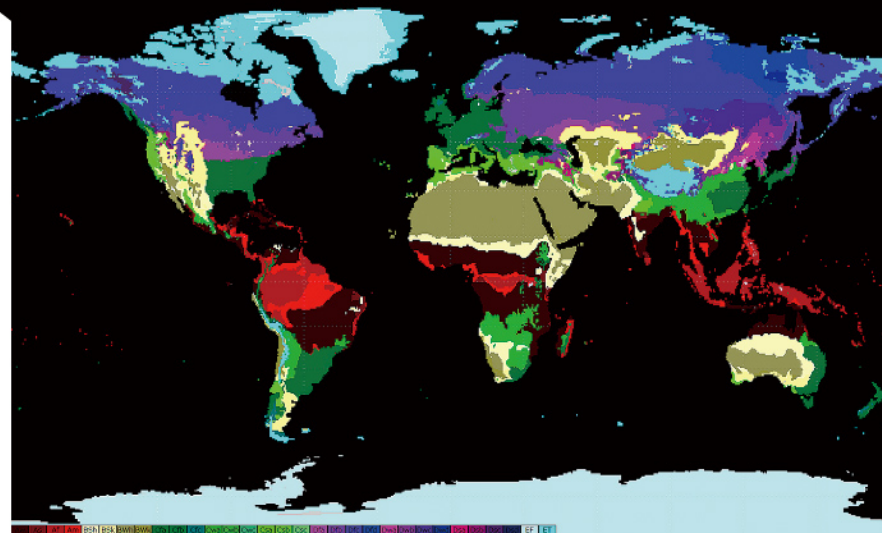
The microclimates created by Space City bring a more comfortable, more appealing resort style to the existing living environment. We believe this will enable urban development in regions with harsh climate conditions and offer ideas for new environmental values to people in urban centers or suburbs of large metropolises.



PJ code LO-001



In Frigid Regions In Deserts

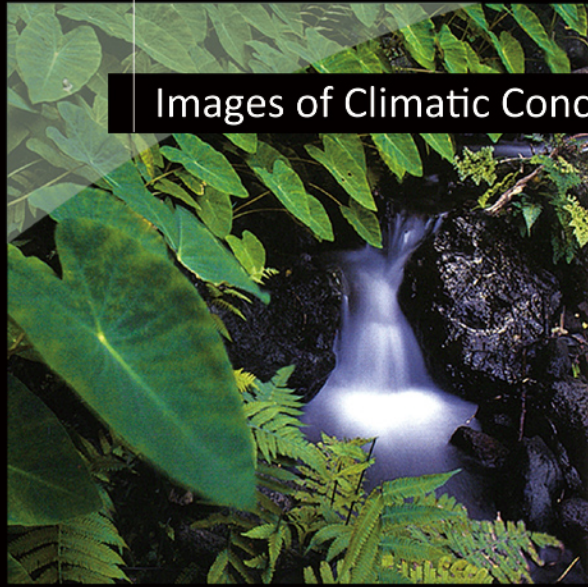


Climate classification



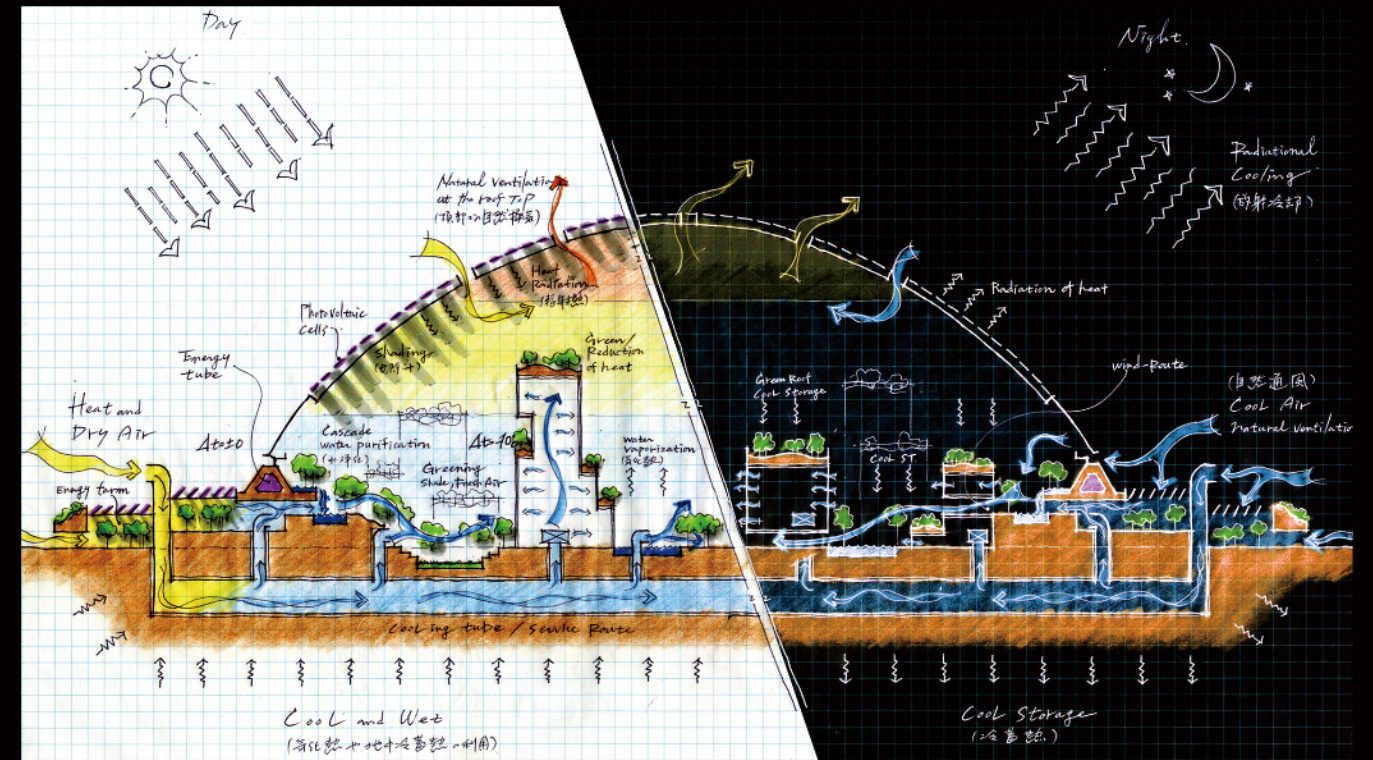
PJ code LO-002

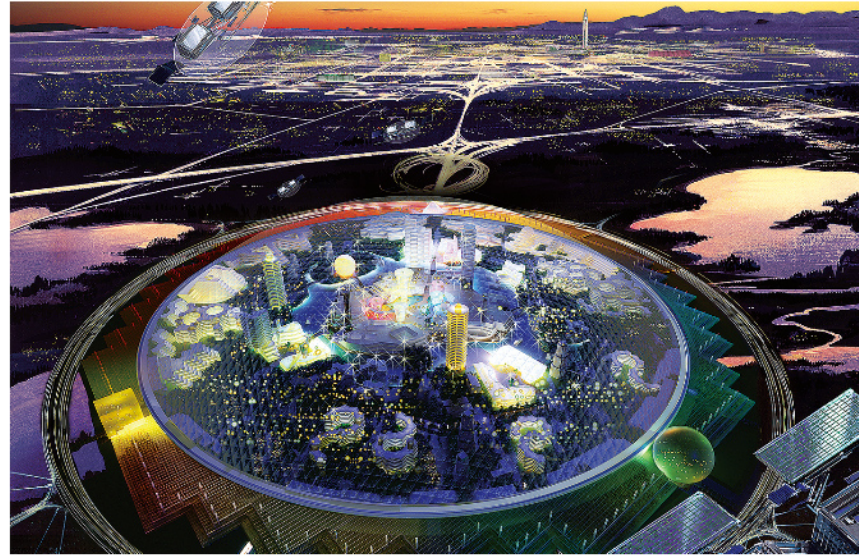
Images of Climatic Concepts



The Workings of Nature

The changes and shifts in nature are essential for the survival of all living creatures, including humans. Space City's microclimate is based on passive systems. The sunlight passing through the City Roof is sufficient for raising plants, and the rainfall will circulate through the area and keep the ground moist. Then gentle winds will blow through the treetops and bring a sense of comfortable change to the city. The seasons come and go, but the tranquility of the living environment remains.





Prototype of Space city

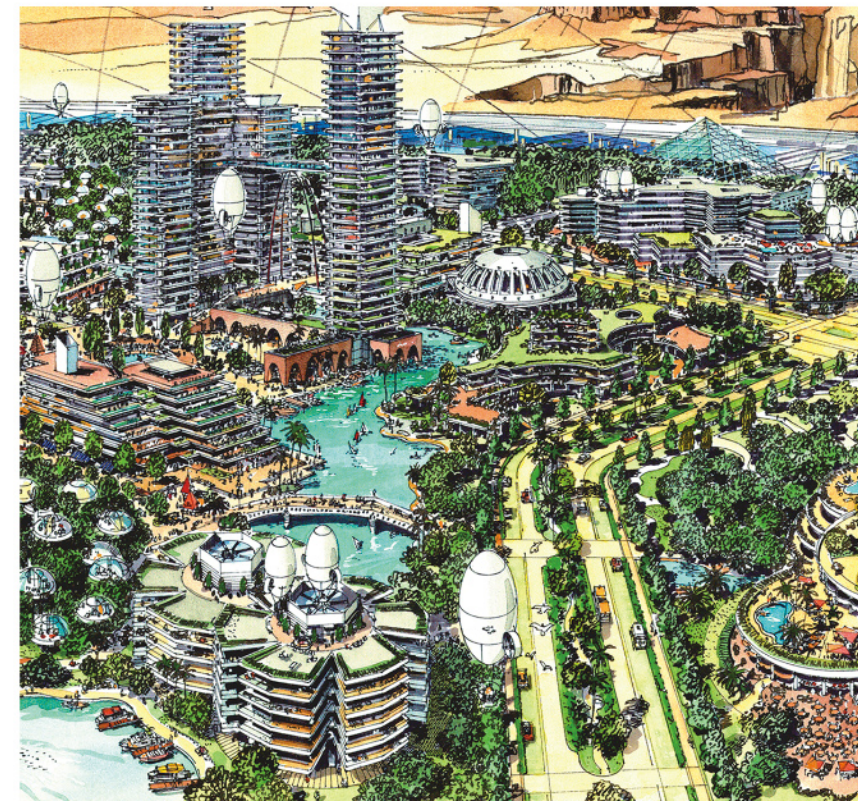
PJ code LN-001



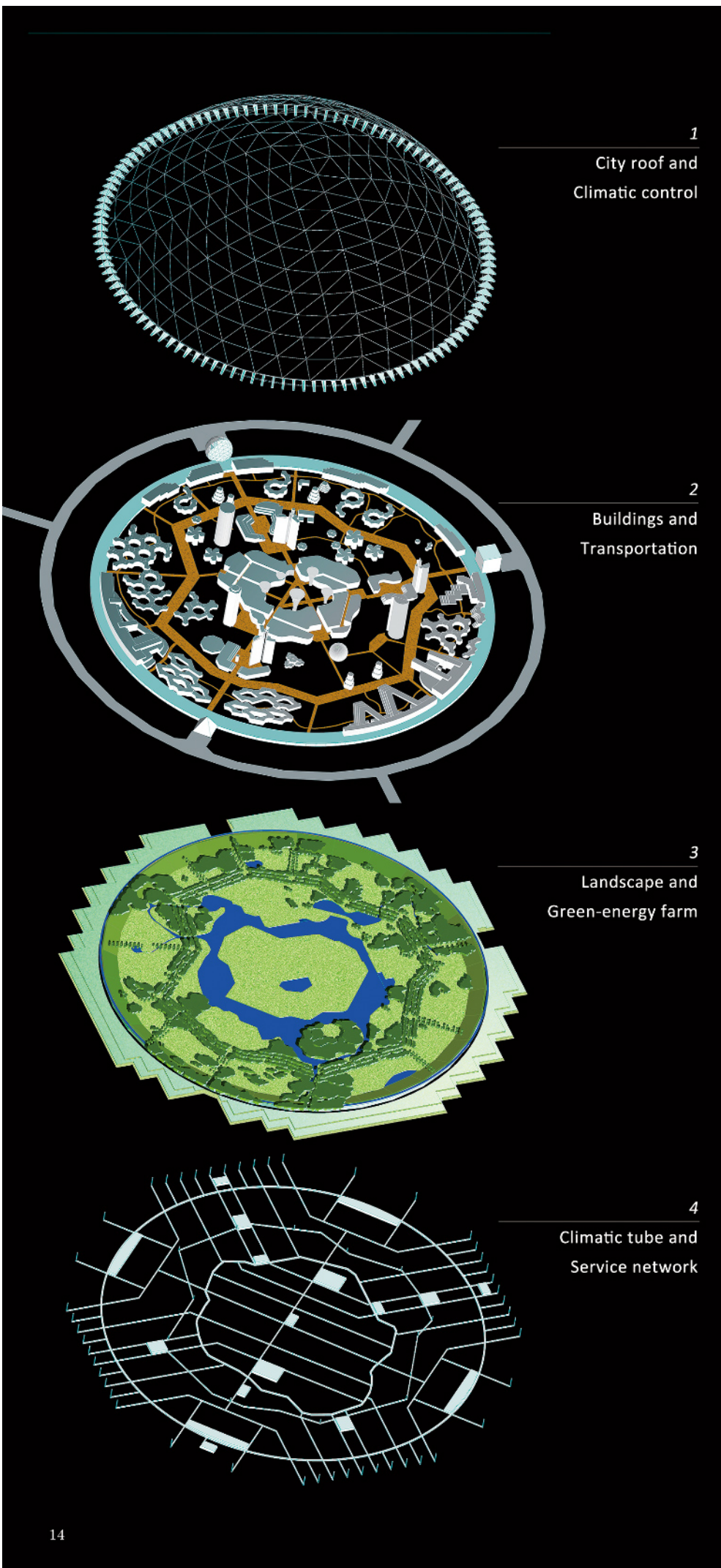
In order to advance development methods and technological studies for Space City, Compact City, a life needs-based complex city, has been planned for the suburbs near metropolitan areas. This micro-city, planned on a scale of 30,000 residents and 20,000 workers, extends in a circular fashion to span a vast area and make daily living functions and services accessible within walking distance. On the other hand, it offers the attraction of a nearby resort to city dwellers—a place to escape the heat or the cold. For these reasons, contact with water and green, directly and as much as possible, has been made the focus of this plan. In the city center, the town floating on water offers hydration and a sense of liveliness to the scenery, and on the opposite side the dwellings and offices are interconnected among the green and the trees. The Space City microclimate offers the living environment a resort style and will surely make the time spent here special.

Program

- Site area: 95ha
- Dome: 1000m in diameter
: 300m in height
- Total floor area: 2,060,000m²
 - Commercial and cultural facilities: 12%
 - Business facilities: 12%
 - Residential facilities: 40%
 - Community services: 2%
 - Eco farm: 12%
 - Public facilities: 22%



Left: Bird's eye view
Above and below: Inside of Space city



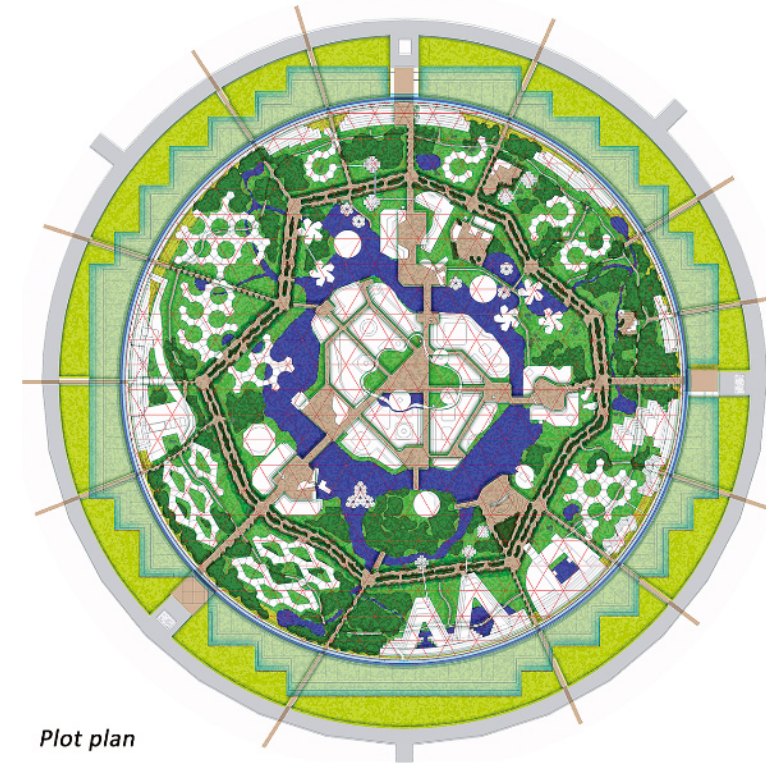
Design for the Green City

City Construction

Space City can be divided into four functional layers as follows. These work interactively to support the complex cycle of the city (and its activity).

Green Space Plan

When planning the various habitats for plants and animals, the water circulation system that runs throughout Space City as well as the location development that gives the city its main characteristics play major roles. Small streams and waterfalls serve as dwellings for certain species and at the same time act as an agent for the purification process for recycling of water. They also provide a landscape that gives the people a sense of peace and comfort. In this manner, we will tie together the water and green environment and the location development from the perspective of the ecosystem, and form a rich natural environment right next to where people live.



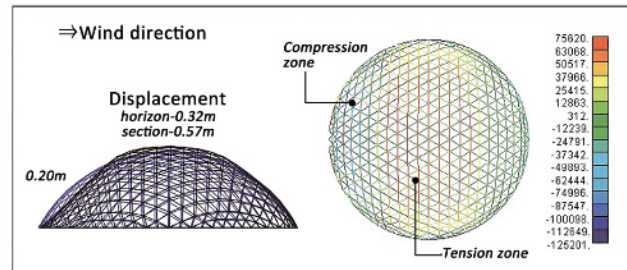
Microclimate Design

With the urban space covered by the City Roof, climate mechanisms are partly self-governing even on such a large scale. The air that flows through the city rises with the temperature from the above-ground residential areas toward the top of the roof. It is then cooled by the outdoor air from the sky above (especially at night) and descends gently to the ground. There is constantly convections of the air in this city. In addition, the wind routes, heat distribution, and sunlight are regulated as needed, maintaining a level of comfort in the residential areas. For example, on a hot 40-degree day, people in this city can probably enjoy 30-degree weather. Furthermore, this system excellently coordinates natural energy of earth, wind, light, water and green, and especially through the above-ground City Roof and the underground Climatic Tube, we believe that their effects can be derived.

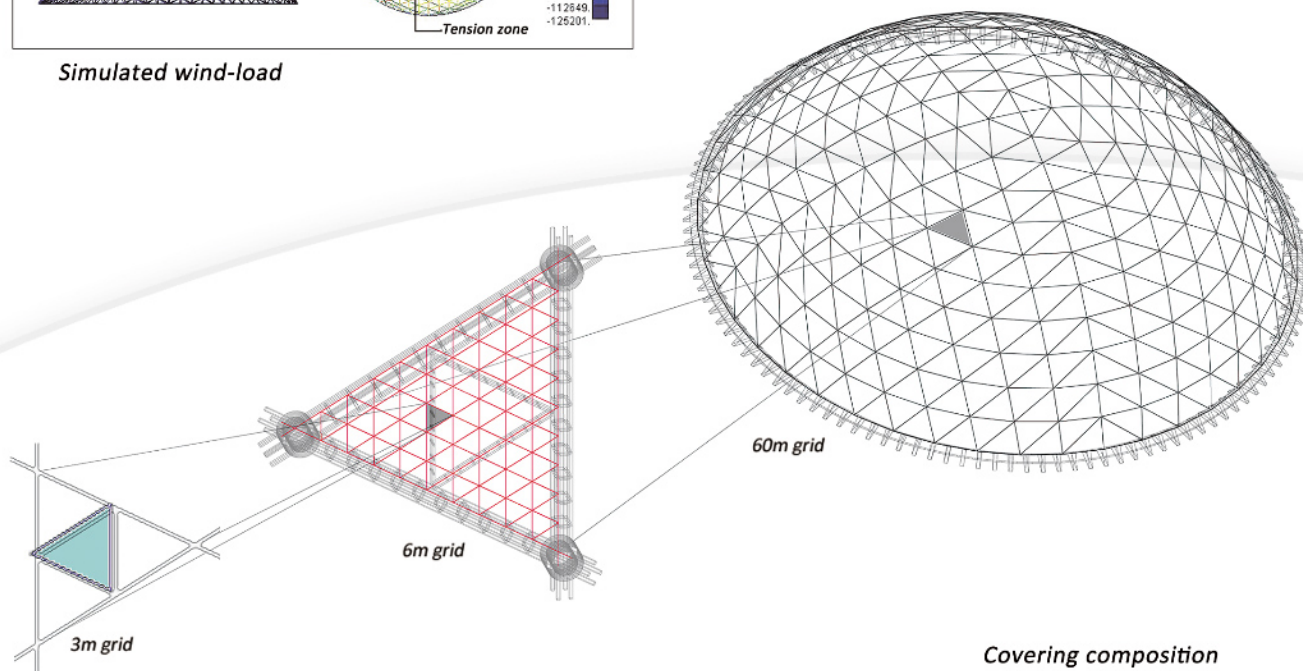


Basic energy for micro-climate.....the ground, wind, the sun, water and green

Technology for Creating the Climatic Space



Simulated wind-load



Covering composition

Structural planning

We have verified the feasibility of construction of a large space with a span of 1,000 meters and maximum height of 300 meters using current structural technologies. The roof comprises three elements: the primary frame (the steel frame truss and tension ring), the secondary frame (for finishing materials), and the finishing materials. For the finishing materials, we are considering glass and membranes for their ability to provide the needed functionality. We conducted stress and deformation analysis on the roof's own weight, earthquakes, wind load, and temperature change, then studied component design and seismic isolation, confirming the safety of the roof. In ad-

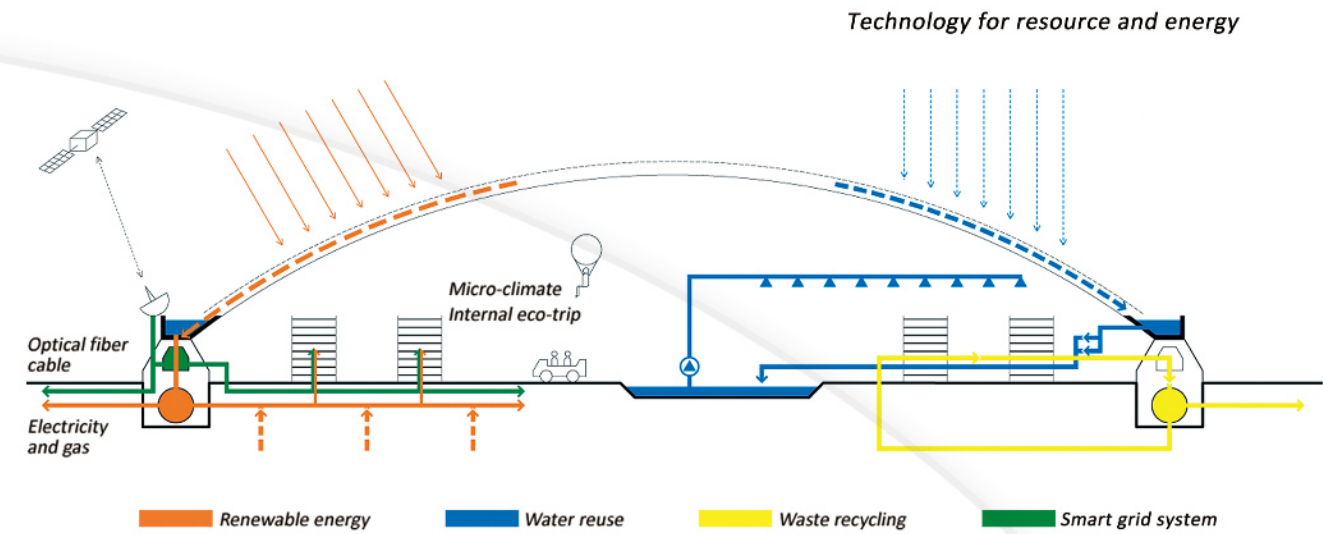
dition, a circular RC structure is planned to support the wide-spanning roof, and the city will be outfitted with transportation systems and other urban infrastructures. After detailed survey and study of the construction site's characteristics based on these results, the massive Space City environment will be achieved.

- Dome specifications**
- Diameter: 1000m
 - Maximum height: 300m/Radius of curvature: 567m
 - Horizontal projection area: 785,000m²
 - Surface area: 1,070,000m²

Energy planning

Development and daily life in cities has a large impact on the Earth and the regional environment. Space City will incorporate an autonomous circulation system designed to run through the entire city so that the burden on the surrounding environment is kept to an absolute minimum. To achieve this, the energy derived from the utilized area's climate and the natural environment itself, as well as fuel cells and other next-generation clean energy, will be included among the city's energy sources. In particular, the large City Roof will play a major role in deriving energy from rain, sun, and wind. Energy demand in each facility, as well as energy supply from the power

and other energy grids, will be monitored and controlled using IT and communications technologies, allowing for stable supply and optimization of energy. Each city will use this sort of autonomous system to minimize the distance needed to supply energy to each facility, and by minimizing CO₂ emissions and energy loss during power transmission, we will proactively reduce the impact on the environment. Primarily, consideration has been given to areas such as use of renewable energy, recycling and reduction of water and resources, and a low-consumption style of urban structures.

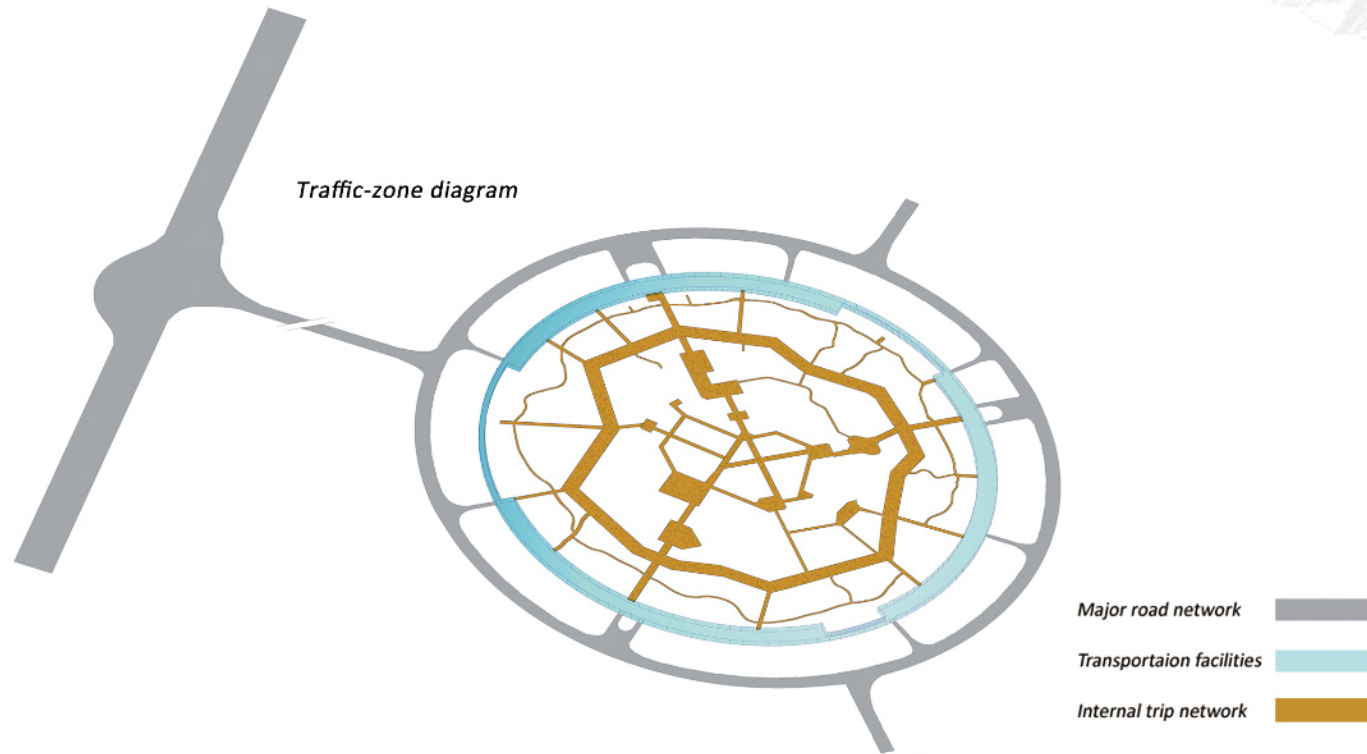


- Environmental technologies under consideration for inclusion**
- Solar power generation (mega solar) and solar heat collection
 - Small-scale hydroelectric generation
 - Small-scale wind power generation
 - Biomass power generation
 - Underground heat storage and other unutilized energy
 - Fuel cells and co-generation
 - Power storage
 - Water and waste recycling

- Environmental capabilities made possible through microclimate and compact living area**
- Longer life buildings and less material use for buildings
 - Improvement of thermal environment through greenery
 - Reduction of energy and emissions needed for transportation

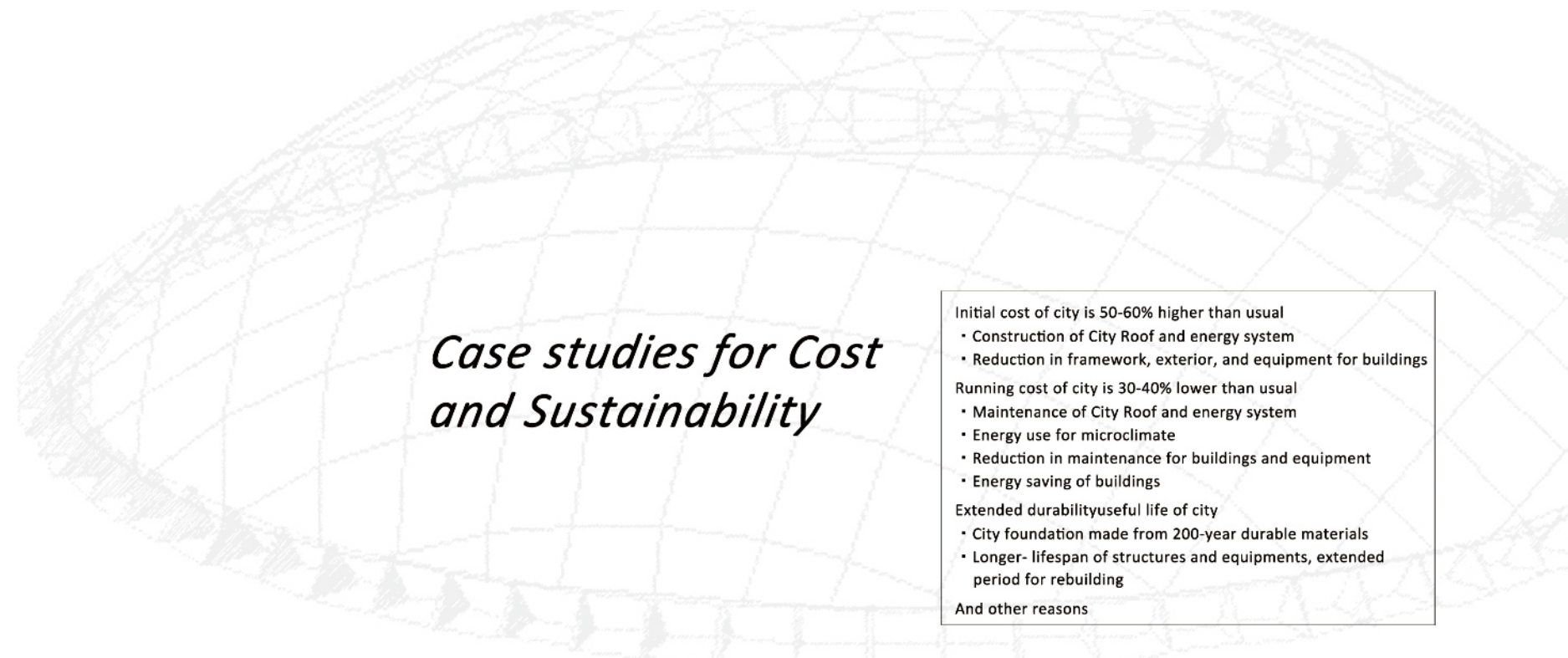
Transportation planning

Two transportation systems, one for access to Space City and the other for movement within the city, have been incorporated based on the concept of park-and-ride. Walking, bicycles, and electric cars will serve as the primary means of transport within the city, and underground distribution routes will be established to help support daily life there.



Disaster prevention plan

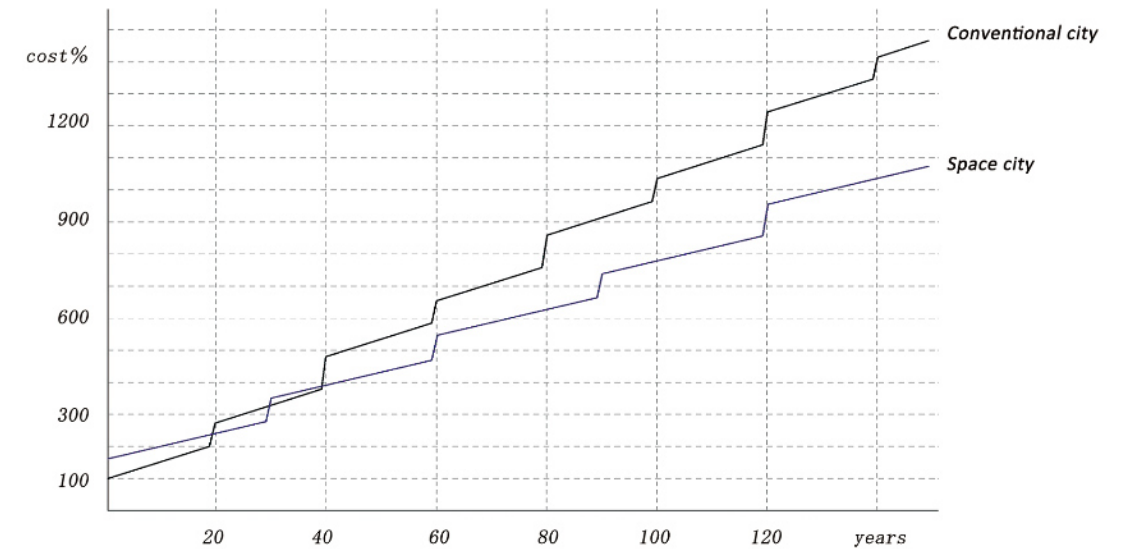
The City Roof covering the city will be of sufficient size and have a structural capacity that is verified against causes of disasters. From the view point of safety in residential areas, the height of 300 meters provides effective clearance in the event of a fire and reduces the risk of damage from heat and smoke. In addition, the glass and membranes used as finishing materials for the roof have an established record of performance in large-scale structures worldwide. In addition, to ensure sufficient supply of energy and water in times of emergency, the city's main facilities are positioned in a decentralized manner according to the planning. To minimize risk during disasters, additional considerations from a wide variety of technological and design perspectives are crucial for the development of the planning.



Case studies for Cost and Sustainability

- Initial cost of city is 50-60% higher than usual
 - Construction of City Roof and energy system
 - Reduction in framework, exterior, and equipment for buildings
- Running cost of city is 30-40% lower than usual
 - Maintenance of City Roof and energy system
 - Energy use for microclimate
 - Reduction in maintenance for buildings and equipment
 - Energy saving of buildings
- Extended durabilityuseful life of city
 - City foundation made from 200-year durable materials
 - Longer- lifespan of structures and equipments, extended period for rebuilding
- And other reasons

Life-cycle pattern



With a view toward 100-year construction

Today's cities face the underlying challenge of building a sustainable cycle, an issue that involves both the global environment and the city's economy. On the other hand, the microclimate proposed by Space City can alleviate the climatic effects of rain, wind, heat and other factors on buildings and the city's infrastructure. This will result in a major shift in the cycle of the city, as mentioned in the factors below, in terms of not only energy use but also maintenance, rebuilding, and even architectural design. While the burden of building an urban infrastructure is immense, in terms of individual businesses

(such as shopping centers, offices, hotels, and residential facilities) in this city, we believe that the city will offer more favorable lifecycle conditions than any environment before. Just as Central Park was conceived for New York in the mid 19th century and continues to support the city's development today, we believe the time has come to consider urban living environments over a span of 100 or even 200 years.

Design Matrix

We believe that Space City, through the new process known as microclimate, will develop in a variety of forms. For example, there will be new development locations—inside or outside of cities—and development sizes—new cities or city central areas. And for the region's climate conditions, unprecedented choices will become available. Particularly in the area of attracting visitors, city environments that are comfortable year-round can contribute greatly to the projects and, in areas from business and tourism to science, art, and sports, further enhance their special features.



Location with urban district



Outside



Near

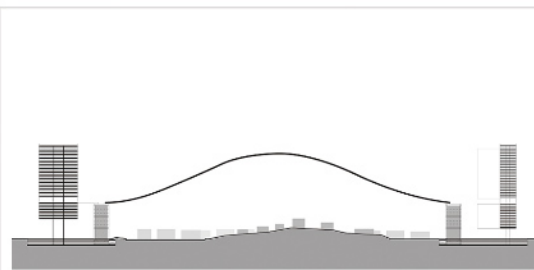


Inside

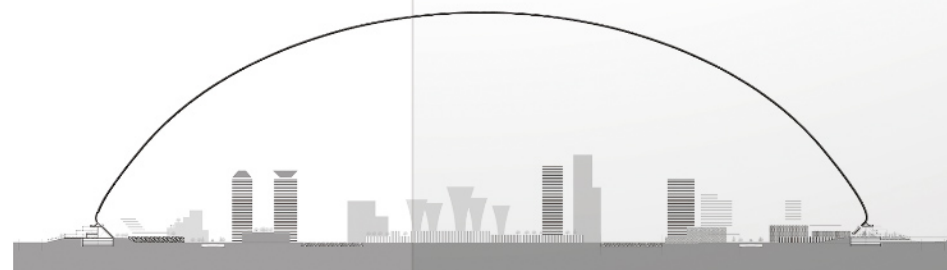
Scale with climatic space



Small

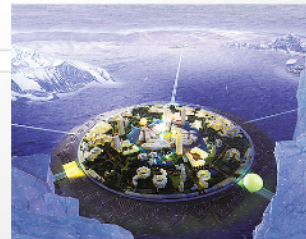


Middle

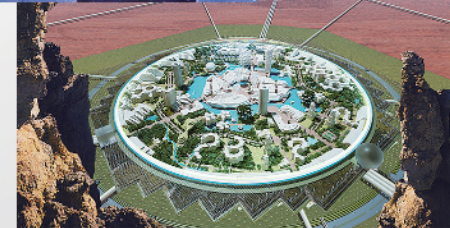


Large

LO-002
Located on the cold area



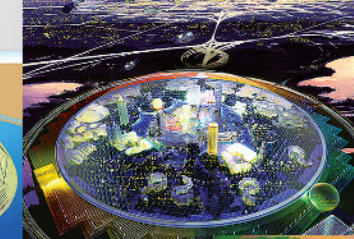
LO-001
Located on the desert



LN-003 *Marine resort*



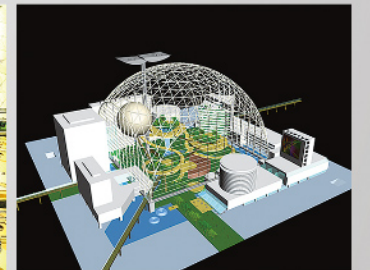
LN-001 *Prototype of Space city*



LN-002
Theme town resort



SI-002
Town center complex



SI-001
Archeological town



MI-001
Central business city

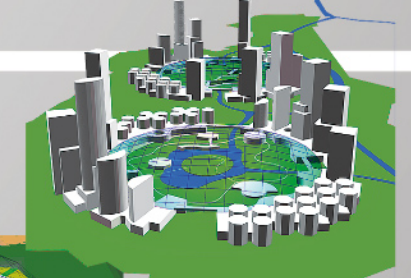
MN-002 *Energy-pavilion park*



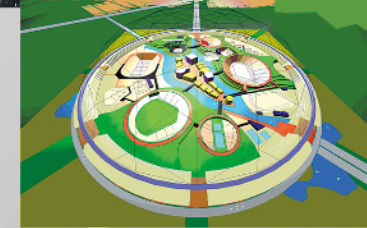
MN-001
Eco-dome park



LI-001
Science and technology park



LN-004
Sports resort



PJ code



SPACE CITY
The City of Change

Bird's eye view / PJ code LN-001